Description

Method for transmitting data to members of an operator service

The invention relates to a method for managing operators of a telecommunications network which are members of an operator service, the network having a plurality of switching offices, and, after an operator has logged on to its home switching office in a data channel, the operator logs on to the peripheral line trunk group (LTG) of the operator via the data channel.

What are referred to as operator services which constitute an essential link between the customers of the network and the network operators are required in telephone networks. Such an operator service has diverse functions, one main function being to distribute information to subscribers on request. For example, an operator may call an operator service in an ISDN network and request information. The respective operator can then, if necessary, access a database, for example, in which case information relating to another subscriber is then provided to him on the screen of a PC. After a connection request by the operator, which can be effected, for example, by pressing a push-button key, the operator is connected to the searched-for subscriber. The operator is then connected back to the originating subscriber and to the searched-for subscriber and can optionally speak to one of the subscribers. Signaling on the D channel then takes place again at the push of a further push-button key, and the connection situations of the two subscribers of the peripheral line connecting group are indicated, and the call channels are connected via the switching matrix so that ultimately there is a direct link between the two subscribers. The example described here

is intended to represent just one of the possibilities or functions of an operator service.

Large networks for a large number of subscribers require a correspondingly large number of operator service systems with a large number of usually hierarchically structured system subscribers (operators), such as, for example, as in the case of the Applicant's system which is called ADMOSS. Messages from the operators to the switching office are sent, as already mentioned, in the D channel, in an ISDN network, specifically in a point-to-point configuration with a permanently active layer 2 of the OSI layer model. The messages are transmitted in an ISDN network with the support of the D channel protocol, for which reason reference is also made to the Blue Book, Volume VI - Fascicle VI. 11, "Digital Subscribe Signaling System No. 1 (DSS1), Network Layer, User-Network Management", Recommendations Q. 930 - Q. 940, in particular to recommendation Q. 931.

The operators are usually located in what are referred to as call centers, and a respective device, composed of a terminal, PC, screen etc. and referred to below, as is the usual practice, as "Console" is directly connected to the system and/or can be connected to the local switching office. However, the need to use decentralized operators, for example within the context of homework, is being increasingly felt, but a single central management system for the operators in the network should still be possible.

Objects and problems of operators are also described in a method of the type mentioned at the beginning in US-A-5 012 512, a solution being described in this document in which, in order to shorten the time expended, not only is request data of a subscriber capable of being displayed and processed on a screen of the operator but also data which the operator has obtained on request from one or more data bases.

US-A-5,469,504 describes a call distributor system having a host computer together the database which is physically connected to all the switching offices, and serves as a system for switching the data between the individual

switching offices to which operators of an operator service are connected. In this system, a call link is firstly offered to an operator via the local switching office, if the operator is not suitably located for this call, this call is transferred to a further operator using the host computer, this transfer being made using a special protocol, referred to in the document as "intertandem protocol". This protocol uses a DTMF method. The expenditure incurred as a result of the use of the host computer in conjunction with the X.25 interface protocol described in the document and the intertandem protocol is, however, to be considered as disadvantageous.

One object of the invention is accordingly to permit network-wide management of all the operators or consoles of the operator system. For example, a central switching office - referred to as master office - should have the information indicating which operators are free or busy or out of service so that, for example, an enquiry of a network subscriber relating to a telephone number, address etc. can quickly be passed on to an operator of a remote switching office if no operator of the local switching office is available. This should thus permit network-wide call distribution in terms of the operators.

This object is achieved with a method of the type mentioned at the beginning in which, according to the invention, after successful loging on, a request for remote logging on to a central master office is transmitted, a call number or call number table of virtual operators located in the master office is transmitted from the peripheral line trunk group to the operator, the operator initiates a voice link to a virtual operator using the call number or call number table, and after the call link has been successfully set up, the request for remote logging on is

transmitted from the home switching office to the master office by means of inter-office signaling, and is conveyed in said master office to its coordination processor, log-on confirmation data and data which is specific to the operator service is then loaded from the coordination processor and/or a peripheral line trunk group of the master office into the peripheral line trunk group of the operator in the home switching office and from there into the operator's terminal, and a status report of the operator is transmitted via a data channel to the peripheral line trunk group of the home switching office and from there via inter-office signaling to the coordination processor of the master office.

Thanks to the invention, an operator system which operates on a network-wide basis and is managed centrally can be provided.

It can be expedient, because it provides a saving in resources, if the local logging on to the home switching office is terminated after the remote logging on of the operator to the master office.

In order to facilitate the operator work, there is provision that the status report is not output until after expiry of a protection time which follows the successful remote logging on.

It is expedient if the data to be transmitted is transmitted from the peripheral line trunk group of the master office to the operator via a data channel other than the voice channel, this constituting the customary possibility for the transmission of data, which is also provided in the network in accordance with regulations.

Because, however, on the other hand, a voice link is set up in accordance with the invention, it may also be expedient if data to be transmitted is transmitted via a voice channel set up between the operator and a virtual operator using a data link program.

The invention is particularly suitable for application in an ISDN network, the data channel being the D channel, and the voice channels being B channels.

The invention, together with further advantages, is explained in more detail below with reference to an exemplary embodiment and by means of the drawing. The latter shows in its single figure the basic structure of a network with two switching offices illustrated and an operator service.

At the top left of the figure there are a number of subscribers OP1, OP2 ... of an operator service OPS, details of the hierarchy within the operators OP1, OP2 ... not being given here. All the operators OP1, OP2... are connected into the network together with customary network subscribers TEI of a telecommunications network NET; said network being in the present case an ISDN network and the connection being therefore made via an S_0 interface, ie. in each case to a network terminal NTE here.

The first switching office VS1 of the network is shown top right and it has, in a manner known per se, a switching matrix SNE and periphery line trunk groups LTG, LTC connected thereto. A coordination processor COP is provided for controlling the switching office VS1, especially the switching matrix SNE. Each peripheral line trunk group LTG, LTC also contains, in a known manner, a group processor GRP, and in this exemplary embodiment concentrators DLU (Digital Line Unit) are connected to each peripheral line trunk group via a U_{k0} interface. Each of these concentrators DLU also has a plurality of inputs for the network terminals already mentioned above. In the case of relatively large switching offices, up to 512 peripheral line trunk groups LTG, LTC can be connected to a switching matrix SNE, and usually two

concentrators DLU are connected to each line trunk group LTG. The peripheral line trunk groups LTG, LTC

each also contain, in a known manner, what is referred to as a group switch GSI.

In a peripheral line trunk group LTG, LTC, various programs are executed which are supported by the group processor GRP, for example the greater part of the connection setup, the signaling, the code reception etc. takes place here. In general, 70% of the connection setup is carried out in the peripheral line trunk groups, whereas especially routing functions are assigned to the coordination processor COP.

The switching office also comprises an operation and maintenance system OMS with an operation and maintenance terminal OMT at which monitoring personnel can continuously monitor the state of the switching office and detects faults.

The operators OP1, OP2 ... of the operator service usually have workstations with personal computers which contain ISDN cards and special software as well as headsets for the operators. The terminals of the operators are also called "consoles" in the following. The operators OP1, OP2, ... can transmit messages to the switching office, especially to the peripheral line trunk groups LTG, these messages being processed in the group processor GRP and lead to corresponding further measures, for example a connection setup. The messages are transmitted in a point-to-point configuration with a permanently active layer 2 and in the D channel in an ISDN network.

Bottom right in the drawing there is a further switching office VS2 which is associated with the network NET and whose structure corresponds basically to the first switching office VS1, but the second switching office VS2 serves as a master office of the operator service. Of course, a large number of

other switching offices (not shown here) may also be provided as a function of the size of the network, as indicated here only by two boxes VS3, VS4.

Each of these switching offices can be assigned operators OP_x, OP_y again.

Each switching office VS1, VS2,... has a particular peripheral line trunk group LTC for fast data links which permit data exchange, within the scope of inter-office signaling, for example in the ISUP signaling system (see for example P. Bocker, ISDN - Digitale Netze für Sprach-, Text-, Daten-, Video- and Multimediakommunikation [Digital Networks for Call, Text, Data, Video and Multimedia communication], 4th Edition, Springer [Publishing house], Section 6.2.9, "Zwischenamtsignalisierung" [Inter-office signaling]), with other such line trunk groups via rapid data links, for example optical fiber lines.

It is essential to the invention that any operator OP1, OP2, ... can log on to a remote office, here the master office VS2. The invention now provides a method which is described below in more detail.

An operator OP1 firstly logs on to his home switching office VS1 by using a password and an ID number - which corresponds to the prior art. After successful logging on, the console of the operator OP1 transmits a request for remote logging on in the master office VS2 to the associated peripheral line trunk group LTG of the home switching office VS1 in the D channel by means of a data link. This request then causes a call number or a call number table of virtual operators VO1, VO2 to be transmitted to the console of the operator OP1.

Such virtual operators are configured in at least one peripheral line trunk group LTG of the master office VS2, and are required to be able to set up an actual call link.

The console of the operator OP1 then uses the call number or one of the possible call numbers in order to set up a call link,

i.e. a link in a B channel to a virtual operator VO1. After successful setting up of this link, the request for remote logging is transmitted via means of inter-office signaling from the switching office of the operator OP1 to the master office VS2 and conveyed to the coordination processor COP in the said master office VS2. In the next step, what are referred to as "log-on response" data and call number data, for example system clock time and date, the hierarchical structure, personal data and different rights, for example access possibilities to statistical data, etc. is loaded from the coordination processor COP and/or a peripheral line trunk group LTG of the master office VS2 into the peripheral line trunk group LTG of the operator OP1 - in the home switching office VS1 - or from here into the operator console. This can be carried out via a data channel (D channel) or via the existing call link in a B channel using a data link program. After determination of this data transmission, the "log-off" is initiated with respect to the "local" log-on between the operator OP1 and home switching office VS1.

However, if the voice link has not been established in the B channel between the operator console and the virtual operator VOP, the next call number of a virtual operator is obtained from the aforesaid call number table by the console and a new link attempt is started.

After a successful log-on in the master office VS2 takes place, expediently after a certain protection time has expired, which is implemented by means of a post-call timer, a status message (operator status message), in this case "idle" is transmitted from the console of the operator OP1 via a data channel link to the peripheral line trunk group LTG of the home switching office VS1. From here, the status message

(here "idle") is transmitted to the master office VS2 using inter-office signaling, for example ISUP as mentioned, and transmitted here to the coordination processor COP. The aforesaid protection time of, for example, 20 to 60 s permits the line of the operator OP1 still to appear seized or busy, and is intended to prevent the operator OP1 being "overloaded" by an enquiry virtually simultaneously with its log-on.

Status changes of the operator OP1, for example from "idle" to "busy" are handled in the same way and are therefore known in the master office VS2.

The invention makes possible, in the manner described above, a network-wide operator service system in which, for example, operators of remote offices can be integrated into the work of this system by virtue of the central management of the system carried out at an office (switching office).